Section 21. Coastal Bays Blue Crab

Introduction:

The blue crab, *Callinectes sapidus*, is a valuable resource to Maryland's coastal bays ecosystem and the commercial and recreational efforts it supports. In 1999, a Comprehensive and Conservation Management Plan was adopted for Maryland's coastal bays. This plan distinguished Maryland's coastal bays as a separate, unique ecosystem from the Chesapeake Bay and recommended that the Maryland Department of Natural Resources (MDNR) address fishery issues specific to Maryland's coastal bays. In accordance with this plan, a Coastal Bays Blue Crab Fishery Management Plan (FMP) was adopted in 2001 to conserve the coastal stock, protect its ecological and socio-economic values, and optimize the long-term utilization of the resource. (Maryland Department of Natural Resources and Coastal Bays Fishery Advisory Committee 2001). A synopsis of the actions can be found on Table 21.1.

Stock Status

Commercial landings (1980 – 2004) and the Coastal Bays Fishery Investigation (CBFI) annual trawl and seine juvenile finfish survey data (1990 – 2004) indicate that the blue crab abundance in Maryland's coastal bays fluctuates without trend (Figures 21.1 and 21.2, respectively). Fishery independent data collected by the CBFI survey indicates that the mean size of blue crabs in the coastal bays is smaller than the mean size of blue crabs in the Chesapeake Bay. This is most likely a result of the higher salinities found in the coastal bays. Recruitment of blue crabs into the coastal bays is assessed using CBFI survey data. The abundance of small crabs (< 60 mm) varies annually without trend. However, it is difficult to determine the factors that lead to this variation as environmental and hydrologic elements play a major role in blue crab recruitment in the coastal bays. Indices of blue crab abundance and recruitment in Maryland's coastal bays show fluctuations without trend, indicating a relatively stable population.

Fishery Statistics

Maryland's coastal bays support both a commercial and recreational blue crab fishery. Since 1980, annual commercial harvest of blue crabs in the coastal bays has ranged from 0.4 to 1.8 million pounds with an average harvest of 1.0 million pounds (Figure 21.1). The recreational fishery is primarily a small boat fishery due to limited public shoreline/pier/bulkhead access. Recreational harvest of blue crabs in the coastal bays in undocumented; however, estimates of recreational harvest from the Chesapeake Bay are between 11 and 40 million pounds annually (Maryland Department of Natural Resources and Coastal Bays Fishery Advisory Committee 2001)

Management Issues

In 1992 watermen from Maryland's coastal bays reported crabs dying in their baited crabpots. Upon investigation, adult and juvenile blue crabs from the coastal bays

of Maryland, Delaware, and Virginia were found infected with *Hematodinium* sp., a parasitic dinoflagellate. Dinoflagellates were found in the hemolymph and tissues of sick crabs where the parasite proliferates and causes mortalities. Studies conducted since 1992 have indicated that in the coastal bays of the Delmarva region, prevalence of infected crabs follows a seasonal pattern with a sharp peak in late autumn. Results indicate that salinity and water temperature are vital components to the proliferation of the parasite and associated mortality. Crabs from Maryland's coastal bays were sampled in July, August, and September of 2003. A total of 434 crabs were assayed for disease and results showed a 12 to 33% infection rate. Watermen reported mortalities during the summer months (Maryland Department of Natural Resources 2004).

There is still much that is unknown about *Hematodinium* sp. and its effects on the blue crab population in the coastal bays. Future research is needed to better understand the mortality associated with this disease so that fisheries managers can work to maintain optimum sustainable blue crab population on Maryland's coastal bays.

Anecdotal evidence indicates that there is a declining satisfaction among recreational crabbers in Maryland's coastal bays. However, commercial and CBFI survey data suggest that population trends do not indicate a problem (Maryland Department of Natural Resources and Coastal Bays Fishery Advisory Committee 2001). Currently, no information is collected on recreational blue crab harvest on the coastal bays. A survey on the recreational harvest could help managers answer questions about the blue crab fishery and may be able to provide recreational crabbers a more satisfying experience.

Conclusion

Abundance and recruitment indices are variable without trend for blue crabs in Maryland's coastal bays indicating a relatively stable population. A parasitic dinoflagellate, *Hematodinium* sp., is a concern for fisheries managers because of the mortality associated with infected blue crabs. Further research is needed to better understand the components of this disease. Anecdotal evidence indicates that there is a declining satisfaction among recreational crabbers in Maryland's coastal bays although fisheries dependant/independent data does not support this. A survey of recreational crabbers could help managers address this problem.

References

Lipton, Douglas W., and S. Sullivan. 2002. The economic impact on Maryland's crabmeat processing industry of proposed regulations: A possession restriction of sponge crabs and crabs smaller than 5 ¼ inches. Maryland Sea Grant Report.

Lukacovic, R., L.S. Barker, and M. Luisi. 2005. Diamondback terrapin and crab pot interactions and effects of turtle excluder devices on crab catch in Maryland's coastal bays. Maryland Department of Natural Resources Fisheries Technical Report No. 44.

Maryland Department of Natural Resources and Coastal Bays Fishery Advisory Committee. 2001. Coastal Bays Blue Crab Fishery Management Plan.

Maryland Department of Natural Resources. 2004. Maryland's Coastal Bays Ecosystem Health Assessment.

Figure 21.1. Commercial harvest figures for blue crabs in Maryland's coastal bays (1980 – 2004). Commercial harvest figures are reported in pounds.

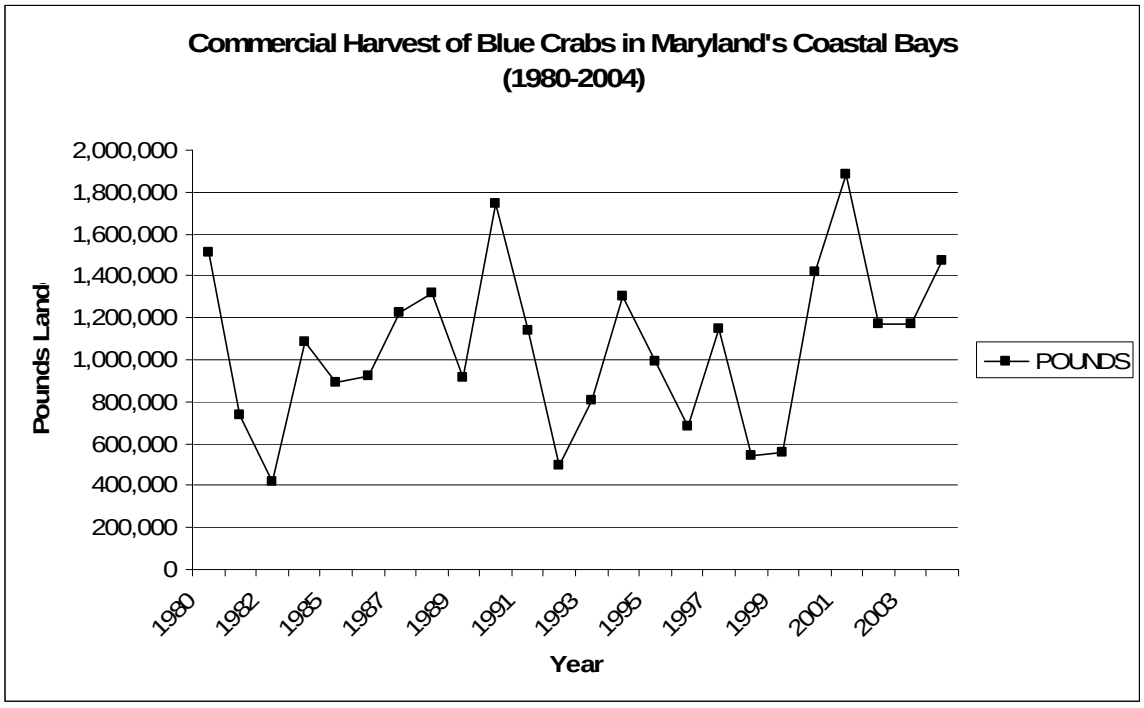

Figure 21.2. Mean Catch-Per-Unit-Effort (CPUE) with 95% confidence intervals for blue crabs collected in Maryland's Coastal Bays Trawl Survey (1990 – 2004). *Approximately 95% of the crabs surveyed are less than 60 mm in length.

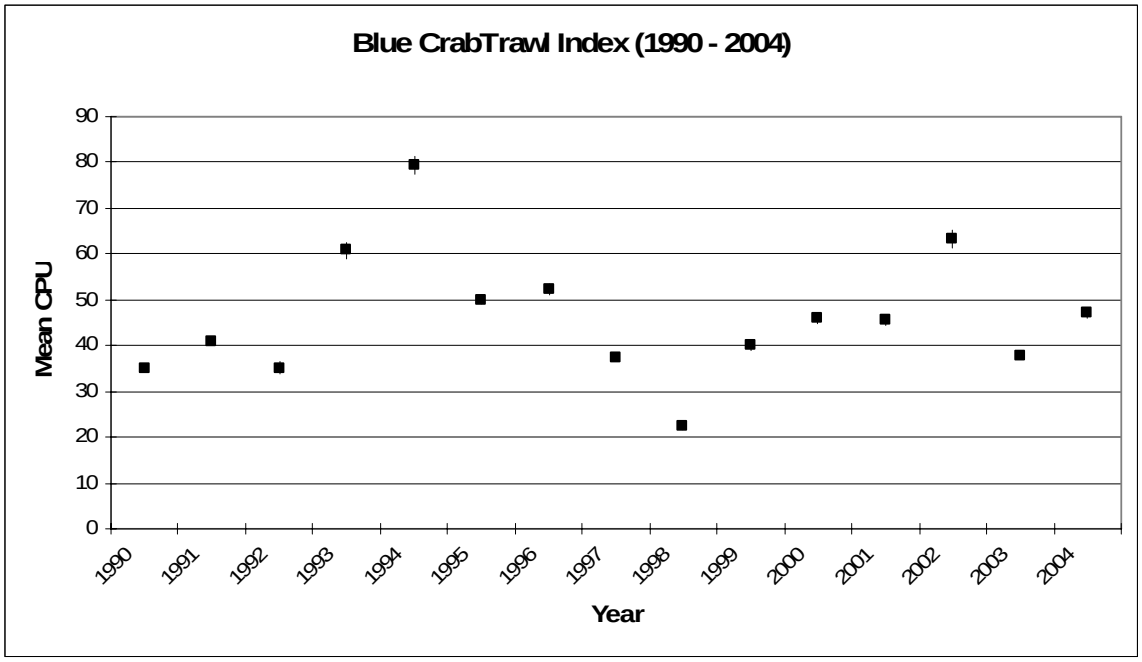

Table 21.1. 2001 Coastal Bays Blue Crab Fishery Management Plan Implementation (10/05)

	Action	**Implementation**
1.	**1.4.1** DNR and MCBP will identify potential funding sources to support the following research and monitoring activities: a) Assess the impact of *Hematodinium* in the coastal bays blue crab population (i.e. identify what intensity of *Hematodinium* infection causes mortality, and identify other factors, environmental and/or biological, that may influence blue crab mortality from *Hematodinium*). b) Identify factors which influence *Hematodinium* proliferation, elucidating different life stages, determining the full life cycle of the parasite, and eventual production of a more specific diagnostic tool either by immunoassay or molecular assay techniques. c) Examine how crabs become infected with *Hematodinium*.	Current research being done including monitoring prevalence in MD coastal bays. For the latest results on *Hematodinium* research see (Maryland Department of Natural Resources 2004).
2	**1.4.2** DNR will define the criteria under which a Marine Protected Area can be effective in assessing the impacts of *Hematodinium* on blue crabs	Not yet initiated.
3	**Action 2.1.1:** Adopt an overfishing threshold consistent with Chesapeake Bay that preserves a minimum of 10 percent of the blue crab's spawning potential (F_{10} percent), and a fishing target that preserves 20 percent of an unfished stock. (F_{20} percent).	Initiation is dependent on discussion with the Coastal Bays Fishery Advisory Committee.
4	**2.1.2:**DNR will work towards implementing the necessary research and monitoring programs to determine the appropriate fishing mortality rates that will achieve the established fishing target of F_{20} percent. (Chesapeake Bay mortality rates (fishing and natural) are not necessarily transferable to Maryland's coastal bays.)	Initiation is dependent on discussion with the Coastal Bays Fishery Advisory Committee.
5	**2.1.3:** DNR will work towards allocating funds specific to the Department's coastal bays blue crab monitoring program and data analysis.	The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in determining what additional information is needed.
6	**2.1.4:** DNR and MCBP will encourage research that examines the stock - recruitment relationship of blue crabs in the coastal bays, level of localized reproduction and entrapment of larvae, and effects of environmental parameters which influence fluctuations in crab abundance (i.e. including this action in the FMP will identify these research needs as a high priority which will better enable DNR, MCBP, Universities and others to obtain support for funding these research projects).	The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in determining what additional information is needed.
7	**2.1.5:** DNR will examine the utility of developing a public outreach indicator(s) of blue crab abundance that can be used to inform the community on the annual status of blue crab stocks in the coastal bays.	The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in

		determining what additional information is needed.
8	**2.2.1:** DNR will establish, implement and evaluate a commercial reporting monitoring program to obtain accurate catch and effort data from anyone crabbing commercially in Worcester County consistent with recommendations of the Atlantic Coast Cooperative Statistics Program. a. Evaluate the effectiveness of the Apilot@ daily logbook reporting system implemented in 2000 for commercial crab harvesters and dealers in Worcester Co b) Consider using the Chesapeake Bay's commercial crab reporting system, but make it specific to the coastal bays, including more detailed information on location of harvest and effort data.	Ongoing.
9	**2.3.1:** DNR will design and implement a recreational crabbing survey in the coastal bays consistent with the pilot recreational crabbing survey in Chesapeake Bay.	A project to determine the design of a survey was completed. The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in determining what additional information is needed.
10	**2.3.2:** DNR will identify potential funding mechanisms to fund and complement monitoring efforts outlined in Strategies 2.3.1 and 2.1.1.	The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in determining what additional information is needed.
11	**2.4.1:** DNR will continue to monitor the abundance and impact of green crabs and other invasive, non-indigenous crab species.	Ongoing.
12	**2.4.2:** DNR will evaluate the following management strategies related to green crabs: a) DNR will prohibit the possession and sale of imported green crabs, and promote the harvest and sale of locally harvested green crabs. b) DNR will prohibit the importation and sale of green crabs.	Ongoing
13	**2.4.3:** DNR will continue to work with Maryland's Non-Indigenous Species Task Force to examine invasive species issues, and develop an Aquatic Nuisance Species Plan to become eligible for Federal funding	Ongoing
14	**2.4.4:** MCBP will develop an outreach program (i.e. brochures) to educate the coastal bays community on the impacts of exotic species.	Ongoing.
15	**2.5.1:** DNR will examine methods/studies to better understand the natural ecological functions of blue crabs in the coastal bays, including the establishment of a Marine Protected Area in the coastal bays.	Not yet initiated
16	**3.1.1:** DNR will improve the accuracy of effort data in the coastal bays' commercial blue crab fishery by implementing actions related to Problem 2.2 - Commercial Reporting.	Ongoing.
17	**3.1.2:** DNR will continue to manage the coastal bays commercial blue crab fishery through the use of	Ongoing.

	time limits, seasons, gear restrictions, catch limits, size limits, limited entry, and other management strategies as necessary, to prevent further increases in fishing effort. a) **Gear Restrictions** - Prohibit the taking of blue crabs in the coastal bays by scrape and dredge to prevent these fisheries from developing, and lessen the gear impacts on blue crab habitat; b) **Time Restrictions** - Establish similar time restrictions to those in the Chesapeake Bay to prevent a shift in crabbing effort from the Chesapeake Bay to the coastal bays during years when crab abundance is low in the Chesapeake Bay. 1) For 2001 - Prohibit the taking of crabs for commercial purposes between 2:00 p.m. and 5:30 a.m.	Action 3.1.2: Prohibition of scrapes & dredges has been enacted. Section .08.02.03.06E Time restrictions have been enacted. Section .08.02.03.06D2 Closed season enacted: November 1 to April 1. Section .08.02.03.06C
18	**3.2.1:** DNR will continue to prohibit the harvest of sponge crabs, and limit the taking of female crabs in the coastal bays through the use of time limits, seasons, area closures, gear restrictions, catch limits, and size limits, as necessary. a) **Area Closures** - DNR will delineate areas where female blue crabs are concentrated (Action 5.2.1(a)), and determine the appropriate time periods for which commercial crabbing and hydraulic clam dredging should be allowed within these areas. The following areas have been identified as potential closure areas but need to be delineated further: 1) The Convention Hall site, bayside of Ocean City roughly between 36th and 50th Street; and 2) The Thorofare site, in southern Isle of Wight Bay; 3) The Bridge site, just north of the Verrazano Bridge on the barrier island side. b) **Catch and Size Limits** - Determine if the current catch and size limits for female crabs are appropriate.	Ongoing. The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in determining what additional information is needed.
19	**3.2.2:** DNR will investigate the economic impact of prohibiting the possession and sale of sponge crabs within the state.	Completed. (Lipton and Sullivan 2002).
20	**3.3.1** DNR will require unobstructed cull rings in crab pots from June 1 through April 30, and will adjust cull ring requirements based upon further research (peeler pot cull ring study being planned on Chesapeake Bay).	Not yet initiated
21	**3.3.1** DNR will require unobstructed cull rings in crab pots from June 1 through April 30, and will adjust cull ring requirements based upon further research (peeler pot cull ring study being planned on Chesapeake Bay).	Not yet initiated
22	**3.3.2:** DNR will determine if measures are necessary to reduce the bycatch mortality of crabs in the hydraulic clam dredge fishery (i.e Action 3.2.1(a) - prohibition of hydraulic clam dredging in areas where female crabs are concentrated).	Not yet initiated
22 a	**3.3.3:** DNR will continue to require terrapin excluders in crab pots set for noncommercial purposes, encourage watermen to install terrapin excluders in commercial crab pots, and investigate the feasibility (i.e. effects on catch; economic impact) of requiring terrapin excluders in all crab pots set in the coastal bays.	Ongoing. (Lukacovic et al. 2005)
22	**3.3.4:** MCBP will coordinate an annual/seasonal volunteer effort to locate and remove derelict pots.	Not yet initiated.

b		
24	**4.1.1:** DNR and MCBP will obtain information on satisfaction levels of recreational crabbers in the coastal bays to evaluate the effectiveness of management measures.	Not yet initiated.
25	**4.1.2:** DNR will examine the effects of habitat quality on the success rates of recreational crabbing in the coastal bays.	Not yet initiated.
26	**4.1.3:** DNR and MCBP will develop and distribute the following information pertaining to the recreational crab fishery in the coastal bays: a) Recreational crabbing brochure summarizing crabbing restrictions; b) Recreational crabbing sign for access points (i.e. boat ramps and fishing/crabbing piers); c) Maps of land-based public access and boat based crabbing locations, list of boat ramps and marinas with rental boats, and recreational crabbing tips.	Ongoing.
27	**4.1.4:** DNR, MCBP, Town of Ocean City and Worcester County will work towards increasing the number of land-accessible areas for recreational crabbing.	Ongoing.
28	**5.1.1:** DNR will alleviate the impact of hydraulic clam dredging and prop scarring to SAV in the coastal bays by: a) Prohibit hydraulic clam dredging in SAV; b) Annually documenting the areas and extent of impact; c) Researching seagrass recovery time; d) Investigating the use of buoys to mark beds, SAV setbacks, depth restrictions, GPS equipment to identify boundaries, and education as tools to protect beds from damage; and e) Implementing and enforcing necessary regulations to protect SAV from hydraulic clam dredging.	Ongoing.
29	**5.1.2:** By implementing Action 3.1.2, DNR will prohibit the taking of blue crabs in the coastal bays by scrape and dredge to prevent these fisheries from developing and impacting SAV.	Completed.
30	**5.1.3:** DNR and MCBP will continue to identify SAV species needing protection and activities needing restrictions.	Ongoing.
31	**5.1.4:** MCBP will expand surveys/citizens monitoring to ground truth SAV species composition and determine accuracy of photo interpretive maps.	Not yet initiated.
32	**5.1.5:** DNR and Natural Resources Conservation Service (NRCS) will develop habitat requirements for the growth of seagrasses in the coastal bays by: a) DNR will develop water quality requirements for seagrassess; b) DNR will identify areas that meet water quality requirements for restoration purposes; c) NRCS will compile data relating coastal bay soil types to bottom communities and identify other variables having effects on seagrass establishment and maintenance; and d) NRCS will complete soil mapping effort for entire coastal bays	a) Completed (Maryland Department of Natural Resources 2004). b) Ongoing. c) Completed by MGS & DNR. d) Not yet initiated.
33	**5.2.1:** DNR will identify and protect blue crab overwintering areas in the coastal bays by: a) Delineating and mapping overwintering areas; and b) Prohibiting hydraulic clam dredging in important overwintering areas year-round, unless data	The 2005 Coastal Bays Blue Crab Stock Assessment (completion of this report is scheduled for the fall of 2006) will aid in

	indicates that these areas can be opened on a seasonal basis (see Action 3.2.1(a)). c) DNR will define the criteria under which a Marine Protected Area can be effective in protecting blue crab overwintering areas.	determining what additional information is needed.
34	**5.3.1:** DNR will support actions in the CCMP, specifically "Challenge 1.9 of the Fish and Wildlife Section" to protect and enhance shallow water and shoreline habitats important to blue crabs. DNR and Worcester County are the lead agencies for the majority of these actions. Refer to the CCMP for more specific information on these actions.	Ongoing.
35	**5.4.1:** DNR will support actions in the CCMP, specifically in the "Water Quality" section and "Fish and Wildlife" section to minimize the impacts of unsuitable dissolved oxygen levels to blue crabs in the coastal bays. Maryland's Coastal Bays Program, Town of Ocean City, and Worcester County are the lead agencies for the majority of these actions. Refer to the CCMP for more specific information on these actions.	Ongoing. (Maryland Department of Natural Resources 2004).
36	**5.4.2:** DNR will identify areas which have unsuitable levels of dissolved oxygen (i.e. < 3 mg/L) for blue crabs.	Ongoing. (Maryland Department of Natural Resources 2004).
37	**5.5.1:** DNR will support actions in the "Water Quality" section of the CCMP to control nutrient, sediment and chemical inputs which will protect and enhance blue crab habitats. Worcester County and Maryland's Coastal Bays Program are the lead agencies for the majority of these actions. Refer to the CCMP for more specific information on these actions.	Ongoing. (Maryland Department of Natural Resources 2004).
38	**6.1.1:** DNR will consider increasing the number of enforcement personnel in the coastal bays, specifically during the crabbing season.	Ongoing.
39	**6.1.2:** DNR will consider expanding the Natural Resource Police reserve officer program.	Ongoing.